THE MOSQUITOES OF THE MOUNTAINS OF CALIFORNIA

(*Diptera, Culicidæ*)

By HARRISON G. DYAR

The territory explored covers the northern half of the Sierra Nevada mountains of California. In a previous paper (Ins. Insc. Mens., iv. 80-90, 1916), I described six new species of *Aëdes* occurring there. I will here notice all the species found in the mountains.

Aedes tahoensis Dyar.

In describing this species, I compared it with *lazarensis* Felt & Young and stated that it might be a variety of that species. The comparison should have been with *pullatus* Coquillett. *Pullatus* has the same mesonotal ornamentation as *tahoënsis*, running somewhat darker than the specimens from the central Sierras. However, *tahoënsis* from the Gold Lake region in Sierra and Plumas Counties is also dark, and there is probably no line of demarcation.

The male genitalia of *tahoënsis* have a spine on the basal lobe; *pullatus* is described as without this spine; but a reexamination of the mounts of *pullatus* shows the spine distinctly present. The genitalia, therefore, are the same, and not different, as I was led to suppose when I described the species.

The larva of *tahoënsis* has the upper head hair in three, the lower single; *pullatus* has both head hairs multiple.[1] The difference may be bridged by specimens in the intermediate territory; but with present information it is necessary to hold the species separate. *Pullatus* is described from the Kootenai region of British Columbia, in the Selkirk Range. I have *tahoënsis* from the northern part of the Sierra Nevada mountains of California and the lower part of the Cascades in Oregon. Careful exploration of the continuation of the Cascade Range

[1] *Pullatus* has the upper head hair in fours, rarely in fives; lower head hair in threes.

northward into British Columbia would be very useful in connection with this problem.

The breeding places of *tahoëensis* are peculiar: Closed pools without inlet or outlet, filled by melting snow, which usually become completely dry by the first of July. These pools are due to irregularities in the surface of the ground, where the ground is compact enough to hold snow-water for a few weeks. They have no connection with stream or lakes, though naturally commoner in valleys. They are not marshy, but have firm margins, the water being held as in a bowl. The water is clear and cold, but must be of a comparatively rich nature from its enclosed state. These pools can often be recognized when dry. In August, 1915, I visited Fallen Leaf Lake and located such a hollow. In April, 1916, as expected, I found it full of water with numerous pupæ of *tahoëensis*. This is the only species that I have found in these pools and they are always present in large numbers, making *tahoëensis* the commonest mosquito of the mountains while it lasts. *Pullatus* has the same habit, I believe; but it is now 14 years since I observed *pullatus*, and my recollection is not as perfect as in the case of *tahoëensis*. There is no species found in the east corresponding to *pullatus* or *tahoëensis*.

Specimens before me referable to *tahoëensis* have been taken as follows: Yosemite Valley, California, May 19, 1907 (D. J. Fullaway), May 14 to 19, 1916 (H. G. Dyar); Little Yosemite Valley, California, May 18, 1916 (H. G. Dyar); Fallen Leaf Lake, Lake Tahoe, California, May 27 to June 24, 1916 (H. G. Dyar); Lily Lake, Lake Tahoe, California, June 16, 1916 (H. G. Dyar); Tallac, Lake Tahoe, California, June 17, 1916 (H. G. Dyar); Tahoe Tavern, Lake Tahoe, California, June 20, 1915 (A. K. Fisher); Summit, Placer County, California, July 3 to 7, 1916, July 19, 1915 (H. G. Dyar); Gold Lake Camp, Plumas County, California, July 19 to 22, 1916 (H. G. Dyar); Gold Lake, Sierra County, California, July 20, 1916 (H. G. Dyar); Crater Lake, Oregon, August 16, 1916 (H. G. Dyar).

Certain specimens of *tahoëensis* from Gold Lake develop a

very deceptive resemblance to *trichurus* Dyar, which species occurs in the Kootenai region, by having the mesonotum very dark with a white lateral spot. However, in *trichurus,* there are three impressed dorsal dark bands and the lateral white spot is entirely in front of the lateral groove;[1] in *tohoënsis* there are but two dorsal impressed lines and the white spot is on both sides of the lateral groove.

Aedes hexodontus Dyar.

Comparison of specimens shows that this species is identical in mesonotal coloration with *lazarensis* Felt & Young and *impiger* Walker. The ornamentation is very variable, being golden yellow with two narrow lines of dark brown scales, or wholly golden yellow, or wholly brown. The form with the distinct brown lines resembles *lazarensis,* the form wholly yellow, *impiger.* The larvæ, however, are distinct from both of these species.

The breeding places of *hexodontus* are marshy pools, filled by snow-water, often very shallow, never deep; often small like the hoofprints of cattle. I found *hexodontus* plentiful in some cattle tracks in the edge of a marsh near Tallac on Lake Tahoe. The cattle tracks were filled by spring water; there were no *hexodontus* in the marsh itself, though other mosquito larvæ were there. At the end of Fallen Leaf Lake, *hexodontus* was breeding in seepage pools in a hollow under poplar trees. The water here was a small stream of drainage from melting snow. At Summit, Placer County, a few *hexodontus* pupæ were taken in a shallow pool in an open marsh with willow bushes. The water in these marshes is comparatively poor in organic matter as the pools are not enclosed and often have considerable current of water through them; but the ground over which they are formed must give a certain richness.

No form representing *hexodontus* was recognized in the collections made in the Kootenai region of British Columbia. This material was taken in 1903 and worked over by Mr. Coquillett at a time when the specific characters of *Aëdes* were

[1]Suture between the mesonotal prescutum and scutum.

not well understood. On going over the old material I find several specimens with pale golden, unbanded mesonotum, much as in one form of *hexodontus*. However, no determination can be made, as the mosquitoes of the Selkirks and Sierras are quite different, several eastern forms occurring in the former. Larvæ and males will have to be compared, which are not at hand in the Kaslo material.

Specimens before me, referable to *hexodontus*, have been taken as follows: Fallen Leaf Lake, Lake Tahoe, California, June 4 to 24, 1916 (H. G. Dyar); Tahoe Tavern, Lake Tahoe, California, June 20, 1915 (A. K. Fisher); Summit, Placer County, California, July 3 to 5, 1916 (H. G. Dyar); Gold Lake, Sierra County, California, alt. 6,582 feet, July 20, 1916 (H. G. Dyar); Gold Lake Camp, Plumas County, California, July 19 to 22, 1916 (H. G. Dyar); Hoquiam, Washington, May 27, 1904 (H. E. Burke).

Aedes increpitus Dyar.

This species belongs to the *cantans* group, in which the adults often are indistinguishable by coloration, but the species separate easily by the male genitalia and larvæ. In the east there are three species, *stimulans* Walker, *fitchii* Felt & Young, and *abfitchii* Felt, the former breeding in river pools and having a short-tubed larva, the two latter breeding in woodland pools and having long-tubed larvæ. *Fitchii* and *abfitchii* have a tendency to a golden coloration of the mesonotum, especially on the shoulders; *stimulans* is grayer. There is also a species, *sansoni* Dyar & Knab, described from Banff, Alberta. Of this no larva is known; the male genitalia agree with *abfitchii*. Mr. Knab and myself associated as *sansoni* specimens from Kaslo, British Columbia, of which only females and larvæ are known; the larvæ agree with *abfitchii*. It is possible, however, that at both Banff and Kaslo there is more than one species of the *cantans* group. However, on the showing made, *sansoni* must be considered a synonym or a western form of *abfitchii*.

Another form, *vittata* Theobald, was described from Pecos Canyon, New Mexico. Males and females were taken, but the male genitalia have not been made known. A wrong larva

was associated. This name can only be identified by further collecting. It is probably not the same as *increpitus*, although the possibility is open.

The larva of *increpitus* has a short tube and frequents river valleys, like *stimulans*, but the genitalia differ. The color of the mesonotum is dark with gray scales at the angles, not yellow; but the character is not diagnostic.

In the Yosemite Valley, in May, I found *increpitus* in vast numbers. The larvæ were not only in the river pools, but occurred in woodland pools; everything in the valley was full of them. The adults were out and males were seen swarming. At Fallen Leaf Lake, the species was breeding in wave pools behind gravel beaches at the northern or outlet end of the lake, in artificial holes over a supply pipe, and in a grassy pool in a meadow close at hand. At Clio, in the Feather River valley, adults were still flying in July. I also got adults in August at Tahoe Tavern at Lake Tahoe. The water in these river and wave pools, frequented by this species, is dilute. The river pools often have a current, while the lake pools are connected by seepage with the lake itself. The larvæ come early, but are of slower development than the black-legged species, and can be found through June. Both males and females can be caught till late in the summer.

Specimens before me, referable to *increpitus*, have been taken as follows: Yosemite Valley, California, May 14 to June 13, 1916 (H. G. Dyar); Little Yosemite Valley, California, May 23 to 28, 1916 (H. G. Dyar); Fallen Leaf Lake, Lake Tahoe, California, May 28 to June 24, 1916 (H. G. Dyar); Tallac, Lake Tahoe, California, June 17, 1916 (H. G. Dyar); Glenbrook, Nevada, August 25, 1915 (H. G. Dyar); Tahoe Tavern, Lake Tahoe, California, June 20, 1915 (A. K. Fisher), August 15, 1915 (H. G. Dyar); Clio, Feather River, California, July 9 to 23, 1916 (H. G. Dyar); Pacific Grove, California, July 2, 1903 (Isabel McCracken); Eureka, California, May 6 to July 6, 1903 (H. S. Barber); Fieldbrook, California, May 26, 1903 (H. S. Barber).

The last three localities are in the coast region of California

and not the Sierras, and there is a possibility that there is a different species involved, no larvæ being known.

Aedes palustris Dyar.

This species belongs to the *cantans* group, but it is distinguishable as adult by the large number of white scales on the wings which invade even the fifth vein. Normally, the abdomen is basally banded with white scales and a few apical white scales also; but a marked variety occurs in which there is a complete line of white scales down the back. I propose to designate this by the new name PRICEI, in honor of Mr. W. W. Price, the proprietor of Fallen Leaf Lodge, to whom I am indebted for many kindnesses. The variety *pricei* has a very marked appearance, quite strongly suggesting *nigromaculis* Ludlow, *riparius* Dyar & Knab, or *euedes* Howard, Dyar & Knab, but to which it is not allied. Type number for the variety *pricei,* No. 21043, U. S. Nat. Mus.

The larva has a long tube and lives in grassy marshes. These larvæ were in the marsh near Tallac referred to under *hexodontus,* and there Mr. Price assisted me to secure several. They were also in the meadow pool near the end of Fallen Leaf Lake referred to under *increpitus.* Several larvæ were found in the Little Yosemite Valley in a pool which was flooded with rain at the time but was apparently originally a grassy meadow pool. Adults were flying in the high mountains about Gold Lake, south of Clio. Here the species *palustris* and *increpitus* were separated, there being no river or wave pools about Gold Lake and only river pools at Clio. Elsewhere, at Yosemite and Fallen Leaf, the species flew together.

Specimens before me, referable to *palustris,* were taken as follows: Little Yosemite Valley, May 20 to June 2, 1916 (H. G. Dyar); Fallen Leaf Lake, Lake Tahoe, California, June 3 to 24, 1916 (H. G. Dyar); Lily Lake, Lake Tahoe, California, June 16, 1916 (H. G. Dyar); Gold Lake, Sierra County, California, July 20, 1916 (H. G. Dyar); Gold Lake Camp, Plumas County, California, July 19 to 21, 1916 (H. G. Dyar).

Aedes vexans Meigen (*sylvestris* Theobald).

This widely spread mosquito occurred rarely in the Yose-

mite Valley. The species is distributed over Europe and North America, being indigenous to both continents. Along the Atlantic seaboard it is one of the commonest species, especially toward the north, breeding in temporary woodland and roadside pools. Of the Yosemite specimens, one was caught May 14, 1916, the other bred from a woodland pool May 22, 1916, where it was associated with the ubiquitous *increpitus*.

Aedes cinereus Meigen (*fuscus* Osten Sacken).

This species also is common to Europe and America and, in the east, breeds in temporary woodland pools. In Yosemite it was bred from valley pools with *increpitus* and at Fallen Leaf from wave pools with the same association. It is thus a river valley species in the west. Previous records of this species from California are lacking, the westernmost record being Kaslo, British Columbia.

The adult has the mesonotum golden brown with traces of two darker lines; abdominal bands narrow, but widening at the sides to form a white lateral line. The legs are without sprinkling of white scales; the male has short palpi.

Aedes cataphylla Dyar.

A very characteristic species, with the thoracic and abdominal marking of *increpitus*, but with wholly black tarsi. The wing scaling also is peculiar. The eggs are much thicker than those of any other species in the Sierras. The male, larvæ, and life history are unknown.

This is the second earliest species to appear on the wing. When I arrived at Fallen Leaf Lodge, May 25, 1916, no mosquitoes were flying except overwintering specimens of *Culiseta*. The first adult of the spring emergence was seen June 2, a specimen of *ventrovittis*. On June 4 *cataphylla* was out in numbers, mixed with a few *tahoënsis*, and they continued to be taken till June 24, when I made my last catch at the lake.

Specimens before me, referable to *cataphylla*, were taken as follows: Fallen Leaf Lake, Lake Tahoe, California, June 4 to 24, 1916 (H. G. Dyar); Lily Lake, Lake Tahoe, California, June 16, 1916 (H. G. Dyar); Glenbrook, Nevada, June 5, 1916 (H. G. Dyar).

Aedes varipalpus Coquillett.

This species breeds in water in holes in trees. It is spread throughout California, both along the coast and in the Sierras, extending up to Washington and British Columbia and into the Kootenai region—wherever there are trees to hold water. Oaks are the most useful trees in this respect though probably alders, willows, and sycamores will serve also. The conifers do not hold water. The species was abundant in Yosemite Valley in May, more abundant than I have ever seen it before.

Specimens before me from the Sierras, referable to *varipalpus,* have been taken as follows: El Portal, California, May 12, 1916 (H. G. Dyar); Yosemite, California, May 13 to 18, 1916 (H. G. Dyar); Tahoe Tavern, Lake Tahoe, California, August 15, 1915 (H. G. Dyar); Homewood, Lake Tahoe, California, August 29, 1915 (H. G. Dyar); Glenbrook, Nevada, August 25, 1915 (H. G. Dyar).

Aedes ventrovittis Dyar.

This species is very early, being the first of the snow-pool species on the wing. At Fallen Leaf, in 1916, which was a very late season, a specimen was taken on June 2. Two others were obtained June 15, after which nothing more was seen of the species. I arrived at Gold Lake July 19, but saw nothing of *ventrovittis* at that time. Prof. W. B. Herms, however, who preceded me at Gold Lake, took several specimens of this species on July 4, it being the only mosquito flying. Gold Lake is about 500 feet higher than Fallen Leaf and about 75 miles farther north; the season is consequently some three weeks later.

The adults resemble *hexodontus* in coloration, having golden yellow scaled mesonotum, but are much smaller. Also the presence of white scales on the wings and the ventral abdominal stripe distinguish them. The males and larvæ are unknown. It will require very early collecting to obtain the life history, and this presents some practical difficulty, as none of the mountain camps are open early enough for this work. They are generally piled up with snow banks and uninhabitable.

Aedes fisheri, new species.

Proboscis, palpi, and antennæ black. Integument black; head with sparse, narrow curved, bronzy brown scales on the vertex, small flat whitish ones on the sides; many erected forked black ones on the nape. Mesonotum with sparse, coarse, narrow curved, bronzy brown scales, becoming straw-yellow around the antescutellar space and over roots of wings; scales on pleura small, flat, whitish. Abdomen black scaled, with small irregular bands of white ones at the bases of the segments, narrowly cleft on the dorsal line, widening on the sides, but not covering over half of the segment; penultimate segment with lateral patches only, last segment wholly black. Venter black scaled, the last two segments wholly black; fourth segment with white scales at base, third largely white scaled on basal half. Legs black scaled, the femora whitish beneath; femora, tibiæ, and first tarsal joint sprinkled with whitish scales. Wing scales black, a few white ones at base of costa and roots of first and fifth veins; outstanding scales long, slender, black, uniform.

Six females, collected by Dr. A. K. Fisher of the U. S. Biological Survey, at Tahoe Tavern, at the outlet of Lake Tahoe, California, June 20, 1915.

Type, No. 21042, U. S. Nat. Mus.

This species is of the size of *cinereus* and *ventrovittis*. The male is unknown, but presumably has long palpi; the mesonotum is dark brown, not bronzy, and has no dark lines; there are white scales on the legs and the abdominal bands do not join in a white lateral line. These characters differentiate it from *cinereus*. It is closest to *ventrovittis*, but the mesonotum is uniformly dark brown, not golden yellow with more or less distinct paired brown lines; there are less white scales on the wings and the ventral black line of the abdomen is lacking. The species is of a different seasonal occurrence; *ventrovittis* is early, none being seen at Fallen Leaf after June 15 of 1916, a very late season. Dr. Fisher took *fisheri* at Tahoe Tavern, a more advanced locality than Fallen Leaf, and in 1915, a normally early season. It is probable that *fisheri* did not ap-

pear in 1916 until July, which may be the reason why I missed this species entirely, as I left the mountains before then.

Culiseta inornatus Williston.

This species is typical of the low country and strays only sparingly into the mountains. It is abundant in Nevada in the valleys at the foot of the mountains surrounding Lake Tahoe; specimens were taken in the mouth of Kingsbury Canyon. It was found breeding in muddy pools in a cow pasture near Glenbrook on the Nevada side of Lake Tahoe. This side has a more arid character than the California side, more resembling the sagebrush plains, with their irrigation pools, so favorable to *inornatus*.

Culiseta incidens Thomson.

Equally at home everywhere in the west, in the plains and mountains, breeding in any enclosed water from rain-barrels to mountain springs. Hibernated adults are the first mosquitoes seen in the spring, and breeding begins early. I found pupæ already in May, 1916, in the Yosemite Valley, while many *Aëdes increpitus* were no further advanced. At Gold Lake the larvæ were in vast numbers in all stages, together with egg-boats, but many already in the last stage, in a marsh only recently vacated by *Aëdes hexodontus*, on July 20, 1916.

The species breeds all summer. I found them in an ice-cold mountain spring at Fallen Leaf, in August, 1915, where they were preyed upon by *Eucorethra* larvæ. In May-June, 1916, they were again in the same spring, again preyed upon by *Eucorethra*.

Culiseta impatiens Walker.

This species was caught at Yosemite, Fallen Leaf, and Gold Lake. The enormous size of the adults is striking.

There is no previous record of this mosquito from California, though it has a northern distribution, from Alaska eastward to the mountains of northern New York. Its occurrence in the Sierras, therefore, was to be expected. The larvæ are known to inhabit cold spring pools and can be found all summer. The adults hibernate.

Culex tarsalis Coquillett.

This species is abundant throughout the west, especially in the lowlands, breeding in all kinds of permanent and semi-permanent pools, except open river-bed pools, taking readily to irrigation water. It occurs throughout the mountains, although in reduced numbers, favoring open warmer pools. Specimens were taken at Yosemite, Fallen Leaf, Lake Tahoe, and Gold Lake, in fact everywhere that I went. The eggs are laid in the usual boat-shaped masses and the adults are supposed to hibernate, although exact observations are lacking. On one occasion I collected recently dried sod from an irrigated pasture at Steamboat, Nevada, and, on immersing the sod in water, three *tarsalis* larvæ hatched. This would indicate that fragments of an egg-boat may exist on dry grass for a time. Whether or not there is normal habit shown here, I am unable to say.

Culex saxatilis Grossbeck (*territans* Auct. non Walk.)

This species is well known as an inhabitant of the Sierras, having been taken at Sisson, California, by Dyar and Caudell in 1906. Larvæ were collected by me in grassy pools near Tahoe Tavern, Lake Tahoe, in August, 1915, and adults were caught in the Yosemite Valley in May, 1916.

A NEW CTENACROSCELIS

(*Tipulidæ, Diptera*)

By CHARLES P. ALEXANDER[1]

The crane-fly described below is one of the largest, if not the very largest, member of its family. The allied *Ctenacroscelis præpotens* Wiedemann (Aussereur. zweifl. Insekt., 1, 40, 41, 1828, as *Tipula*) has long been considered to be the giant of the family; but the wing of the female of *præpotens* barely attains a length of 40 mm., whereas the male of the new species measures at least as much; the females are larger than the

[1]Contribution from the Entomological Laboratory of Cornell University.